

IN THE CLAIMS

Please amend the claims as follows.

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1. (Currently Amended) An apparatus ~~Apparatus~~ for edge detection, comprising:
- means for receiving an image signal;
 - first means for ~~first~~ detecting whether a second derivative of the image signal crosses zero;
 - second means for detecting, in response to a positive result from the first means for detecting, ~~second detecting~~ whether a first derivative of the image signal is greater than a first threshold;
 - third means for detecting, in response to a positive result from the second means for detecting, ~~third detecting~~ whether an indication of an edge frequency ~~is~~ meets a predetermined criterion; and
 - means for supplying an edge identification in response to a positive result from the third means for detecting.

2. (Currently Amended) The apparatus of claim 1, wherein:

- the image signal comprises a luminance signal;
- the indication of the edge frequency is a ratio between a third derivative of the luminance signal and a first derivative of the luminance signal; and
- the predetermined criterion is whether the ratio is greater than a threshold.

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CON- 3. (Original) The apparatus of claim 2, wherein the third derivative is low-pass as a result of being calculated from a low-pass second derivative.

4. (Original) The apparatus of claim 1, wherein the image signal results from a vertical scan of an image, and the edge identification corresponds to a horizontal edge.

5. (Original) The apparatus of claim 1, wherein the image signal results from a horizontal scan of an image, and the edge identification corresponds to a vertical edge.

6. (Original) The apparatus of claim 1, wherein the image signal comprises a luminance signal and the second derivative is a low-pass second derivative.

7. (Original) The apparatus of claim 1, wherein the image signal is a luminance signal and the first derivative is a low-pass first derivative.

8. (Currently Amended) The apparatus of claim 1, ~~comprising wherein the~~
means for receiving, first means for detecting, second means for detecting, third means for detecting,
and means for supplying comprise a computer readable medium ; readable by a data or signal
processing device, embodying code adapted to effect the ~~listed~~ operations.

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CDN-1 9. (Currently Amended) The apparatus of claim 1, ~~comprising wherein the~~
means for receiving, first means for detecting, second means for detecting, third means for detecting,
and means for supplying comprise at least one ~~special-purpose~~ hardware unit adapted to perform the
~~listed~~ operations.

10. (Currently Amended) The apparatus of claim 9, ~~further comprising wherein~~
the at least one hardware unit comprises a separate respective ~~special-purpose~~ hardware unit adapted
to perform each of the detecting operations.

11. (Original) The apparatus of claim 1, wherein the image is a video image and the
image signal is a luminance signal.

12. (Original) The apparatus of claim 1, wherein the second derivative is a low pass
second derivative resulting from a convolution between a second derivative operator and an operator
corresponding to a low pass filter.

13. (Currently Amended) The apparatus of claim 12, wherein the operator corresponding to the low pass filter is of the form $[1, 2, \dots, m, \dots, 2, 1]$, where m is an integer variable relating to an up-scaling factor applied to the ~~video~~ image signal prior to edge detection.

14. (Currently Amended) The apparatus of claim 13, wherein an operator corresponding to the low pass second derivative is of the form $[-1, 0, 0, 0, 2, 0, 0, \underline{0}, -1]$.

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cont
15. (Previously Presented) The apparatus of claim 1, wherein the first derivative is a low-pass derivative resulting from a convolution between a derivative operator and an operator corresponding to a low pass filter.

16. (Original) The apparatus of claim 1, further comprising an edge linking unit.

17. (Currently Amended) An image ~~Image~~ processing apparatus, comprising:

- an input for receiving an image related signal;
- a means for effecting a combined low pass filter and derivative operation on the image related signal, without separating the two operations; and
- an output for providing a result of the combined low pass filter and derivative operation.

18. (Original) The apparatus of claim 17 wherein the derivative is a second derivative.

19. (Original) The apparatus of claim 18, wherein the derivative is a first derivative.

20. (Currently Amended) A method for edge detection, comprising the steps of
~~executing the following operations in a data or signal processing device:~~

- receiving an image signal;
- performing a first detection detecting whether a second derivative of the image signal crosses zero;
- in response to a positive result from the first detection detecting, performing a second detection detecting whether a first derivative of the image signal is greater than a first threshold;
- in response to a positive result from the second detection detecting, performing a third detection detecting whether an indication of an edge frequency meets a predetermined criterion; and
- supplying an edge identification in response to a positive result from the third detection detecting.

21. (Original) The method of claim 20, wherein
- the image signal comprises a luminance signal;
 - the indication of the edge frequency is a ratio between a third derivative of the luminance signal and a first derivative of the luminance signal; and
 - the predetermined criterion is that the ratio is greater than a threshold.
22. (Original) The method of claim 21, wherein the third derivative is low-pass as a result of being calculated from a low-pass second derivative.
23. (Original) The method of claim 20, wherein the image signal results from a vertical scan of an image, and the edge identification corresponds to a horizontal edge.
24. (Original) The method of claim 20, wherein the image signal results from a horizontal scan of an image, and the edge identification corresponds to a vertical edge.
25. (Original) The method of claim 20, wherein the image signal comprises a luminance signal and the second derivative is a low-pass second derivative.
26. (Original) The method of claim 20, wherein the image signal is a luminance signal and the first derivative is a low-pass first derivative.

27. (Currently Amended) The method of claim 20, ~~comprising effecting the~~
~~operations in response to a medium, readable by the data or signal processing device and embodying~~
~~code~~ wherein the steps are performed by code embodied on a computer readable medium.

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CON- 28. (Currently Amended) The method of claim 20, ~~comprising effecting the~~
~~operations in at least one special purpose~~ wherein the steps are performed by at least one hardware
unit.

29. (Currently Amended) The method of claim ~~29~~ 20, wherein the at least one
~~special purpose~~ hardware unit comprises a separate respective ~~special purpose~~ hardware unit adapted
to perform each of the detecting steps ~~operations~~.

30. (Original) The method of claim 20, wherein the image is a video image and the
image signal is a luminance signal.

31. (Original) The method of claim 20, wherein the second derivative is a low pass
second derivative resulting from a convolution between a second derivative operator and an operator
corresponding to a low pass filter.

32. (Currently Amended) The method apparatus of claim 31, wherein the operator corresponding to the low pass filter is of the form $[1, 2, \dots, m, \dots, 2, 1]$, where m is an integer variable relating to an up-scaling factor applied to the ~~video~~ image signal prior to edge detection.

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CDN- 33. (Currently Amended) The method of claim 32, wherein an operator corresponding to the low pass second derivative is of the form $[-1, 0, 0, 0, 2, 0, 0, \underline{0}, -1]$.

34. (Currently Amended) The method apparatus of claim 20, wherein the first derivative is a low pass derivative resulting from a convolution between a derivative operator and an operator corresponding to a low pass filter. ~~The apparatus of claim 12, wherein the low pass filter is of the form $[1, 1, \dots, 1]$.~~

35. (Currently Amended) The method of claim 20, further comprising ~~an edge~~ linking at least two identified edges unit.

36. (Currently Amended) An image ~~Image~~ processing method, comprising the
steps of executing the following operations in a data processing device:

- receiving an image related signal;
- effecting a combined low pass filter and derivative operation on the image related
signal, without separating the two operations; and
- providing a result of the combined low pass filter and derivative operation.

37. (Original) The method of claim 36, wherein the derivative is a second derivative.

38. (Original) The method of claim 36, wherein the derivative is a first derivative.

39. (Currently Amended) An edge ~~Edge~~ detection apparatus, comprising:

- an input adapted to receive an image signal;
- a processing apparatus adapted:
 - to detect at least one edge having higher frequency content in the image signal
and at least one edge having lower frequency content; and
 - to distinguish the edges having higher frequency content from the edges
having lower frequency content; and
- an output arranged to supply an edge detection indication only in response to the
edges having higher frequency content.

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40. (Currently Amended)

The apparatus of claim 12, wherein the low pass filter is

of the form $[1, 1, \underline{1}, \dots, 1]$.
